APPENDIX F

Methodology for Predicting TFMCA Plant Communities From Hydrologic Data

Appendix F. Methodology for Predicting TFMCA Plant Communities from Hydrologic Data

Plant community distribution in wetlands is dynamic both spatially and temporally. When delineating or predicting plant community distribution often there are no distinct lines where one community type ends and another begins; rather, communities tend to grade or blend together in a gradual transition. Community composition may also vary temporally. For example, as water levels rise and fall and annual plants germinate and die-off, the characterization of the plant community may change. What might be called slough under high-water conditions, may become emergent wetland or wet prairie during low-water periods. When water lily (*Nymphaea odorata*) sloughs in Hopkins Prairie dried during an extended drydown, emergent wetland species such as beak rush (*Rhynchospora inundata*) germinated and become dominant (Clough and Best,1991), thus changing the classification of the area to wet prairie. However, when flooding returned to the site, water lilies responded by sending leaves out and once more changing the area back into slough.

Taking into consideration the dynamic nature of wetland plant communities, our objective was to create a simple model that could be used to predict the plant communities that would likely occur under the hydrologic conditions created by each of the alternatives. For this analysis, we created a model that uses four hydrologic parameters that are commonly used to describe the distribution of wetland plant communities in Florida. These parameters were frequency of inundation, average annual depth, maximum depths, and minimum depths. Thirty-six sources were found which described plant community distribution relative to these parameters (Table F-1).

Our first step was to identify broad based plant community descriptors that would be useful for this type of analysis. We selected five plant communities: open water/aquatic bed, slough, emergent wetland, transitional wetland, and upland. Individual plant species were then assigned to each of these categories. Literature values reported for the individual species were then used to calculate the general range in values for each parameter under which each broader community type would likely be found (Table F-2). It is obvious that there is considerable overlap in the hydrologic conditions each community can tolerate.

Each plant community was then assigned a general score ranking from one to five (Table F-3). Then we broke each hydrologic parameter down into a group of categories. For example, categories for frequency of inundation ranged from <5% to >95% (Table F-4). Plant communities that were reported to occur within each of the categories for each parameter were then placed next to the category. The general score for each of these plant communities was then averaged to determine a score for that category. For example, a frequency of inundation between 86-95% could support an emergent wetland (EW; score 3), slough (SL, score 2) or open water / aquatic bed (OW/AB, score 1; Table F-4). The score applied to this hydrologic condition would be a two (3+2+1 / 3=2). Likewise an area with an average annual depth of 0.16-0.84 ft. could support either emergent wetland (3) or transitional wetland (4) and therefore would receive a score of 3.5.

Next we weighted the importance of each of the hydrologic parameters. Frequency of inundation and average annual depth were considered to be more important determinants of plant community structure because they represent long-term conditions. Both of these parameters were weighted at 30%. Maximum and minimum depth, which incorporate short-term drydown and flood events, were weighted with less importance at 20% each. Weighted index ranges were then determined for each plant community by looking at the lowest and highest score a community could receive to be considered within the tolerable ranges for that community. For example, the lowest score a transitional wetland could receive for each hydrologic parameter is 3.5, 3.5, 3.5 and 3 (Table F-4) for a weighted score of 3.41 ((3.5 x 0.3)+(3.5 x 03) + (3.5 x 0.2) +(3.0 x 0.2)). The highest score a transitional wetland could receive is 4.5, 4.5, 4.5 and 4.5 for a weighted score of 4.50 ((4.5 x 0.3) + (4.5 x 0.3) +(4.5 x 0.2) + (4.5 x 0.2)). The range for the weighted index of a transitional wetland is then 3.41 – 4.50 (Table E-5).

To predict plant community distribution that would occur under each alternative, a weighted hydrologic index score was determined for each elevation contour. For example, an elevation of 17.5 feet under the Preferred Alternative, had a predicted frequency of inundation of 86% (score = 2), an average annual depth of 1.30 ft. (score = 2.5), a maximum depth of 2.65 ft. (score = 2.5) and a minimum depth of –0.14 ft. (score = 2; Table F-4). The weighted index score for this elevation contour is 2.25 ((2.0 x 0.3) + (2.5 x 0.3) + (2.5 x 0.2) + (2 x 0.2)). Using Table F-5, a score of 2.25 indicates the 17.5 ft elevation under the Preferred Alternative would likely support a slough community. In this manner, each alternative was evaluated where plant communities were predicted for the area between each elevation contour. The area between contour lines, in reality, experiences a range of conditions and for this analysis this area was generalized and assumed to experience the hydrologic conditions at the upper contour elevation. For example, the area between the 17.25 ft. and 17.50 ft. contour actually experiences frequency of inundation in the range 89-86%, but we apply the 86% for the entire area. This bias was carried throughout the analysis of all the alternatives.

Table F-2. Summary of hydrologic parameters derived from literature. Values in parentheses are the number of sites for which the parameter range was derived.

Community	Frequency of Inundation	Average Annual Depth (ft.)	Maximum Water Depth (ft.)	Minimum Water Depth (ft.)
Open Water/Aquatic Bed (OW/AB)	85-100% (11)	> 1.73 (11)	>4.10	> 0.33
Slough (SL)	80-100% (35)	1.20 – 3.32 (22)	1.75 – 4.10 (11)	-3.50 – 0.33 (4)
Emergent Wetland (EW)	50-95% (99)	0.15 – 2.38 (75)	0.79 – 4.00 (35)	-3.50 – 0.25 (27)
Transitional Wetland (TW)	15-70% (18)	-0.38– 0.84 (15)	0.25 – 1.75 (13)	-4.94 – -2.14 (6)
Upland (UP)	<15%	< -0.38	< 0.25	< -4.94

Table F-3. General scores applied to each plant community type.

Community	General Score
Open Water / Aquatic Bed (OW/AB)	1
Slough (SL)	2
Emergent Wetland (EW)	3
Transitional Wetland (TW)	4
Upland (UP)	5

Table F-4. Exclusive ranges for assigning community status for each hydrologic parameter.

Community	Score	Frequency of Inundation (%)
OW/AB or SL	1.5	>95
OW/AB, SL or EW	2	86—95
SL or EW	2.5	81—85
EW	3	71—80
EW or TW	3.5	51—70
TW	4	16—50
TW or UP	4.5	5—15
UP	5	<5

Community	Score	Average Annual Depth (ft.)
OW/AB	1	> 3.32
OW/AB or SL	1.5	2.39—3.32
OW/AB, SL or EW	2	1.74—2.38
SL or EW	2.5	1.21—1.73
EW	3	0.85—1.20
EW or TW	3.5	0.16—0.84
TW	4	-0.37—0.15
TW or UP	4.5	-1.00—0.38
UP	5	<-1.00

Community	Score	Maximum Depth (ft.)
OW/AB	1	>4.10
SL	2	4.01-4.10
SL or EW	2.5	1.76—4.00
EW or TW	3.5	0.80—1.75
TW	4	0.25—0.79
TW or UP	4.5	0.16—0.25
UP	5	<0.16

Community	Score	Minimum Depth (ft.)
OW/AB	1	>0.33
SL	2	-0.26—0.33
SL or EW	2.5	-2.15—0.25
SL, EW or TW	3	-3.51—2.14
TW	4	-4.95—3.50
TW or UP	4.5	-5.50—4.94
UP	5	<-5.50

Table F-5. Weighted index ranges for predicted plant communities.

COMMUNITY	WEIGHTED INDEX
Open Water (OW)	1.15 – 1.60
Slough (SL)	1.61 – 2.40
Emergent Wetland (EW)	2.41 – 3.40
Transitional Wetland (TW)	3.41 – 4.50
Upland (UP)	4.51 – 5.00

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